

REMARKS

An excess claim fee payment letter is submitted herewith for 5 additional independent claims.

Claims 1-20 are all the claims presently pending in the application. Claims 1-2, 6-7, 9-18, and 20 have been amended to more clearly define the invention. Claims 1-2, 6-7, 9-10, 14, 16 and 18 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Applicant gratefully acknowledges that claims 2-8 and 16 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. This Amendment rewrites claims 2, 6-7, and 16 into independent form including all of the limitations of the base claim and any intervening claims to place claims 2, 6-7, and 16 into condition for immediate allowance. However, Applicant respectfully submits that all of the claims are allowable.

Claims 1, 10, 14, and 18 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, and 5 of Shimizu, et al. (USPN 6,466,186). Claims 1, 10, 14, and 18 stand rejected under 35 U.S.C. 102(e) as being anticipated by Shimizu, et al. (USPN 6,466,186). Claims 1, 9-15, and 17-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Awamoto, et al. (USPN 6,452,590), in view of Minamibayashi (USPN 5,943,030)

These rejections are respectfully traversed in the following discussion

I. THE CLAIMED INVENTION

A first exemplary embodiment of the claimed invention, as recited by independent claim 1, is directed to a drive apparatus for a plasma display panel that includes an image signal accumulator that accumulates the intensity signals for a plurality of pixels to generate an accumulated intensity signal, an accumulated value comparator that compares the accumulated intensity signal to a prescribed value, and a charge recovery timing control circuit that controls the length of a charge recovery period from a time at which a charge recovery operation of the charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential based upon the results of the comparison.

A second exemplary embodiment of the claimed invention, as recited by independent claim 9, is directed to a drive apparatus for a plasma display panel that includes a power consumption detection circuit that measures a power consumption of the plasma display panel and a charge recovery timing control circuit that controls the length of a charge recovery period from a time at which a charge recovery operation of the charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential based upon the power consumption.

A third exemplary embodiment of the claimed invention, as recited by independent claim 10, is directed to a method that includes accumulating the intensity for each pixel of a plasma display panel for each frame or for each field of an image signal and obtaining an accumulated value thereof, comparing whether the value is larger or smaller than a prescribed value, and changing the length of a charge recovery period from a time at which a charge

recovery operation of the charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential, in response to the comparison results obtained when comparing the value.

A fourth exemplary embodiment of the claimed invention, as recited by independent claim 14, is directed to a drive apparatus that includes an image signal accumulator that accumulates the intensity signals for a plurality of pixels to generate an accumulated intensity signal, an accumulated value comparator that compares the accumulated intensity signal to a prescribed value, and a charge recovery timing controller for controlling the length of a charge recovery period based upon the comparison.

A fifth exemplary embodiment of the claimed invention, as recited by independent claim 18, is directed to a method that includes detecting the accumulated intensity of a plasma display panel, comparing the accumulated intensity with a threshold value, and controlling the length of a charge recovery period based upon the results of the comparison.

A conventional device for charge recovery on an alternating current type plasma display uses an inductive (LC) resonant circuit. If the time constant of the inductive (LC) resonant circuit is made large in order to achieve a sufficient recovery efficiency, the action of electrical charge recovery causes a loss of sharpness in the sustaining pulse applied to the scanning and common electrodes, so that there is a tendency for discharge to start before the drive voltage has risen completely. If discharge occurs midway during electrical charge recover, the discharge current is supplied from the LC resonant circuit rather than the power supply line. Since the energy stored in the conductance of the LC resonant circuit, the power supply capacity is reduced, which increases the voltage drop because of the discharge current. This increase in the voltage drop weakens the discharge and reduces the intensity of the

display.

The intensity of the display may be increased by providing a strong discharge.

Further, intensity of the display may also be improved by advancing the timing after the charge recovery. However, advancing the timing causes a decrease in the charge recovery efficiency and an increase in the variation in intensity which results from a variation in the display load that is established by the number of pixels in each display line.

Moreover, it is preferable to retard the timing after the charge recovery to reduce the variations in the intensity and, thereby, obtain a smooth gray-scale characteristic.

Thus, it has been difficult to balance the conflicting demands of advancing and retarding the timing after the charge recovery.

In contrast to the conventional display drive apparatus, the claimed invention includes a charge recovery timing control circuit that controls the length of the charge recovery period of the charge recovery circuit based upon a comparison of an accumulated intensity signal with a prescribed value.

In this manner, the present invention is capable of controlling a clamp timing of the sustaining pulse to give priority to gray-scale characteristics when the display intensity is high and controlling a clamp timing of the sustaining pulse to give priority to the peak intensity when the display intensity is low.

II. THE DOUBLE PATENTING REJECTION

The Office Action rejects claims 1, 10, 14 and 18 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, and 5 of U.S. Patent No. 6,466,186 (hereinafter “the ‘186 patent”). Applicant respectfully traverses this

rejection.

Independent claims 1, 10, 14, and 18 each recite accumulating the intensity of pixels in the plasma display panel and comparing the accumulated intensity with a prescribed value.

None of claims 1, 3, and 5 of the '186 patent teach or suggest the feature of comparing the accumulated intensity with a prescribed value.

Applicant respectfully requests withdrawal of this rejection of claims 1, 10, 14, and 18.

III. THE PRIOR ART REJECTIONS

A. The '186 Patent

Regarding the rejection of claims 1-2, the Examiner alleges that the '186 patent teaches the claimed invention. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by the '186 patent.

The '186 patent does not teach or suggest the features of the present invention including a charge recovery timing control circuit that controls the length of the charge recovery period of the charge recovery circuit based upon a comparison of an accumulated intensity signal with a prescribed value. As explained above, this feature is important for controlling a clamp timing of the sustaining pulse to give priority to gray-scale characteristics when the display intensity is high and controlling a clamp timing of the sustaining pulse to give priority to the peak intensity when the display intensity is low.

In stark contrast, the '186 patent appears to disclose lengthening the charge recovery period based upon the display load amount. Specifically, the '186 patent appears to disclose an arithmetic circuit 4 that detects the display load amount (col. 10, lines 19-21), lengthening

the charge recovery period when the display load amount is small (col. 9, line 66 - col. 10, line 6), and shortening the charge recovery period when the display load amount is large (col. 10, lines 6 - 17).

The '186 patent also appears to disclose gradually the length of the charge recovery period as the display load amount increases (col. 8, lines 16 - 47).

The '186 patent does not appear to disclose the feature of a charge recovery timing control circuit that controls the length of the charge recovery period of the charge recovery circuit based upon a comparison of an accumulated intensity signal with a prescribed value. Indeed, the '186 patent does not mention anything at all relating to a prescribed value, let alone controlling the length of the charge recovery period based upon a comparison of accumulated intensity with the prescribed value.

Therefore, the '186 patent does not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection of claims 1, 10, 14 and 18.

B. The Awamoto et al. reference in view of the Minamibayashi reference

Regarding claims 1, 9-15, and 17-20, the Examiner alleges that the Minamibayashi reference would have been combined with the Awamoto et al. reference to form the claimed invention. Applicant submits, however, that these references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention.

Applicant submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, the Examiner does

not even support the combination by identifying a reason for combining the references.

The Examiner alleges that it would have been obvious to one of ordinary skill in the art to modify the plasma display panel disclosed by the Awamoto et al. reference to control the timing of the charge recovery period as disclosed by the Minamibayashi reference in order to “recover and reuse the electric charges applied during the data recover (sic) period, and since the data is variable, the timing of the recovery has to variably (sic) controlled.”

Firstly, the claims of the present application have been amended to clarify that it is the length of the charge recovery period which is being controlled. In contrast, while the applied references appear to disclose controlling the timing of the charge recovery period, neither of the Awamoto et al. reference to and the Minamibayashi reference teaches or suggests changing the length of the charge recovery period, let alone changing the length of the charge recovery period based upon the results of a comparison of an accumulated intensity with a prescribed value.

Secondly, the Examiner’s alleged motivation is completely inapplicable because the device disclosed by the Awamoto et al. reference recovers and reuses the electric charges that are applied during the data recovery period (i.e addressing period: col. 2, lines 39-43), therefore, the device disclosed by the Awamoto et al. reference does not need to be modified in order to “recover and reuse the electric charges applied during the data recover (sic) period” as alleged by the Examiner. Indeed, the Awamoto et al. reference is specifically directed at reducing the power consumed during the addressing period (col. 2, lines 23-25 and 31-33).

Moreover, even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each

and every element of the claimed invention.

None of the applied references teaches or suggests the features of the present invention including a charge recovery timing control circuit that controls the length of the charge recovery period of the charge recovery circuit based upon a comparison of an accumulated intensity signal with a prescribed value. As explained above, this feature is important for controlling a clamp timing of the sustaining pulse to give priority to gray-scale characteristics when the display intensity is high and controlling a clamp timing of the sustaining pulse to give priority to the peak intensity when the display intensity is low.

Regarding claim 9, contrary to the Examiner's allegations, while the Awamoto et al. reference discloses a power supply, the Awamoto et al. reference does not teach or suggest a power consumption detection circuit that measures a power consumption of the plasma display panel, and a charge recovery timing control circuit that controls the length of a charge recovery period based upon the power consumption.

Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 1, 9-15, and 17-20.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-20, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

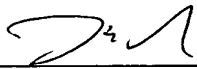
Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed

below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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